DOCUMENT RESUME

ED 275 299 IR 012 357

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TITLE The PC: More Than an Electronic TA.
PUB DATE Sep 85
NOTE 27p.; Paper prepared for the National Institute of Education.
PUB TYPE Viewpoints (120) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Uses in Education; Databases; *Educational Administration; *Educational Change; Higher Education; Input Output Devices; *Microcomputers; Online Searching; *Writing for Publication

ABSTRACT

The impact of the personal computer (PC) will affect both how college faculty will work and interrelationships between faculty and students and will aid in communication between scholars and between campuses. The PC provides educators with the opportunity to reexamine and restructure education constructively so that it provides potential for greater individual personal growth and meets the needs of post-industrial society. PC's are more accessible and increasingly user friendly, offer benefits across all disciplines, and provide revolutionary applications. Much learning and basic teaching can be done effectively by programmed instruction/reading/exercises/review and testing, which can be packaged on floppy disks. The challenge is to use the PC in ways which make more time for students to have thoughtful interactions with faculty. The relative ease with which information can be obtained through computer searching of databases and software packages that take care of statistical calculations can help facilitate the research expected of college faculty. The peril to be avoided is the use of the same data to write multiple papers and articles for presentation at the rapidly increasing number of conferences being held or for publication in the also rapidly increasing number of journals being published. To help teachers make effective use of PC's, administrators must provide training, assistance in obtaining hardware and software, and must facilitate and coordinate services between or within different departments. (DJR)

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ED275299

The PC: More Than an Electronic TA

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Prepared for the National Institute of Education
September 1985

IR013357

THE PC: MORE THAN AN ELECTRONIC TA

INTRODUCTORY STATEMENT

The primary concern addressed in this essay is the impact of personal computers--pc's--on college faculty. The immediate concern is how pc's will affect the work of individual faculty. The longer-term and larger concern has to do with the inter-relationship between faculty and students in the context of higher education.

I wish to make it clear at the outset that I think that the impact of the pc on higher education will be parallel to that made by printing--and I think the introduction of the printed book revolutionized higher education. I see the pc not as an extension of the computation and simulation capabilities of computer, but as a vehicle [either standing along or coupled to a mainframe] for storing and accessing knowledge.

If that is a realistic assessment, the pc--like printed books and libraries--will have a fundamental impact on how faculties perform their role within the educational process. The possible roles to be played by pc's are many. And, unlike the TA [teaching assistant] who operates under direct and personal faculty supervision--and who is hired and fired by the faculty, educational programs involving pc's are capable of taking on a momentum of their own.

This essay reflects a very personal, individual view. It reflects my own experiences and observations as well as my prejudices.

THE CHANGING CAMPUS WORLD

While I was outlining this essay, the New York Times published an article titled "A Changing World for Professors." This article, by Gene I. Maeroff, was the cover story for a special section, "Education: Summer Survey" [August 18, 1985]. Inside the section was a collection of articles grouped under the heading "The Troubled Faculty."

Because of the task I had set for myself, I turned to this section with heightened interest. These articles collectively dealt with the changing professional world in which college faculty find themselves. I expected to find ideas about pc's in the life and work of faculty, but employment and advancement were the issues reported to be troubling the faculty. The changes detailed had to do with conditions and issues related to career and promotion opportunities.

Missing was any mention of the pc-related changes which struck me in the fall of 1984, as I reentered the university environment after a hiatus of 12 years. I now teach on a fairly large [some 20,000 students], private, urban university rated "very competitive" by most of the campus guides. As I returned to teaching, I immediately became aware of the presence and influence of pc's.

A substantial number of students now arrive on campus with a pc instead of a portable typewriter.

Students also have their own direct telephone lines in their living accomodations, whether on or off campus. I don't think

many of them have modems, but much of the infrastructure for them to hook in computer networks is in place.

I have had to revised my expectations and grading for papers based on literature review or data analysis. For $5 students can use terminals in the main library for non-prime time searches of data archives stored in mainframes elsewhere in the country. Accounts for access to the campus mainframes are readily available to students with computation problems.

About a third of my colleagues have pc's, mostly used for word processing. Apples and IBM's make us an incompatible group. Different software packages compound the incompatibility. Conversation about equipment and programs competes with discussion of new books and journal articles.

These are some of the changes in the campus environment which I have experienced. And the changes are widespread on campuses throughout the nation.

My own research and writing increasingly involves computer searches. Heavy use of the microfiche collections which enrich our library adds to the eye strain resulting from hours spent looking at my pc's display screen.

Appropriately, one of the first steps in writing this paper was a computer search of the literature. The material produced by this search testified to the increasingly widespread distribution of pc's on the nation's campuses. Article after article appeared on the screen detailing extensive programs to equip students and faculty with terminals or pc's.

The evidence is amplified by personal knowledge. The university where I did my graduate work is embarked on a program to provide all faculty with compatible pc's over the course of the next several years. The small residential college which my daughter is entering plans to have terminals in each student's dormitory room before she graduates. My own college has just made a major investment in pc's for all the department offices.

ACADEMIC MYOPIA

Yet the Times articles contained no mention of such change. Readers of the Times were given no reason to consider the present and future impact of personal computers on the teaching environment and faculty performance, on the satisfaction or dissatisfaction of individual college teachers.

This left me quite discomfited. I think that we are already in the early stages of a major revolution in the field of higher education and that the driving force of this revolution is the pc.

The omission of pc's from the Times articles underlined the problem with which I am attempting to grapple in this essay: an almost trade-union attitude on the part of faculty and college administrators which results in academic myopia.

The world is changing for college professors, but I fear that, like the Times writers, many college administrators, faculty organizations and individuals are ignoring the role of personal computers in that change.

The irony of this is that college administrators are pushing and shoving at the door of manufacturers, seeking grants of

equipment and software. They publicly brag--with justification--about expanded accessibility for both students and faculty to the pc's.

It is worth noting that, despite relatively moderate salary levels, many college teachers have made personal investments to obtain pc's of their very own.

A CYNIC'S SCEPTICAL VIEW OF EDUCATIONAL "FADS"

In the period since World War II there has been a series of attempts to improve, to expand, to reform education through technological innovation. In the 60's and 70's I helped compile a number of case studies documenting such attempts both in this country and elsewhere. What I saw in the course of doing those studies produced a personal metamorphosis from enthusiast to sceptical cynic regarding technological innovation in education.

There are very real needs for improving, enhancing the educational experience on college campuses [indeed, throughout the educational structure]. However, I confess that I have little faith that administrators possess either the vision or the will to produce solutions to these needs.

I detail this personal view because it obviously colors what I say here about pc's. I see college administrators as being more concerned with costs and budgets than with educational attainment. It is easy to see how their attention is shifted from long-term goals and accomplishments to dollars saved and raised. They are removed from daily classroom contact with students. Instead, they are constantly wrestling budgetary

crises while operating in the vortex of pressures from boards, politicians, alumni, parents, general public, as well as students.

My conclusion is that educational administrators turn to technology for the wrong reason. Too often they really are seeking financial panaceas rather than educational improvement. I will also confess to a personal suspicion that many administrators are more concerned with public relations than educational outcome; that a crises is seen as a handle for working the financial pump. Raising money becomes an end unto itself, and new technologies are "sexy" means for achieving that end.

Technology is used as a quick "fix" in the worst sense of that word's usage; or, alternatively, as a "status symbol" which shows that the institution is "on the cutting edge" of the field. The result is a "technological faddism" in education at all levels. And these fads result in considerable outlay of funds for a sequence of "new teaching technololgies" as the means of dealing with the current crisis.

Fad-based investments are substituted for leadership and direction. The great glacier of post-secondary education rumbles on, making changes of direction only when encountering substantial openings or obstacles. The GI Bill and changing demographics following World War II constituted such an opening. The nation's collective expectation concerning access to higher education changed from an elitist to a populist one. The student uprisings of the late 60's and early '70's, on the other hand,

posed an obstacle. Colleges shifted curricula in an excess of permissive reforms. The current calls for return to emphasis on core subjects and the humanities generally are attempts to redress that excess.

This pessimistic view of academic administrative leadership reflects a traditional professorial suspicion of administrators. This suspicion has been intensified by over a decade of administrative duties. My guess is that administrators are investing in pc's in the same way they have invested in previous technological innovations. If that is the case, I see it as cause for fearful concern because, in my estimation, many past investments been misguided and wasteful.

A NEED FOR ACTION

An urgency accompanies the pessimism.

We do need reform in the process we call "higher education."

The personal computer does have the potential of helping to effect positive reform.

The personal computer is going to change the system.

The personal computer provides the potential for a major revolution in "The Future World of Professors" [and students].

And, unlike previous technological innovations in higher education, the personal computer has the potential to by-pass faculty opposition, hesitation, disinterest.

At least in some fields, the pc can supplant faculty. However, if it does so, it will represent the culmination of administrative/faculty foolishness which has been eroding the basic concept of higher education since the end of World War II.

A statement like that can create a racing pulse and shortage of breath. It is an outburst releasing personal exasperation which has been building over a quarter of a century. This exasperation stems from a growing confusion between "post secondary education" and "higher education" in the American society.

To lower the risk of cardiac arrest, let's shift our thoughts to consideration of the idea, the ideal of higher education. This is a necessary step if we are to try to constructively examine the question of impact of pc's--or any other innovation--on colleges and their faculties.

Like most college faculty, I received no formal preparation for teaching. But as a graduate student in the 1950's, my mentors impressed upon me that the role of the "professor" was based on the model of Socrates. Our students were to gather around us, learning to organize their thoughts about the world through the guidance of the wise teacher. Our campuses were to be modern adaptations of the "grove of academe."

Between Socrates and my lecture room debut, the only real technology which has had revolutionary impact on this student-teacher relationship was the invention of printing. The storing of knowledge through collections of written records was an ancient one, but printing revolutionized the breadth of sharing. With printing and the resulting spreading availability of books, the faculty lost its monopoly on knowledge. Literate students with access to books could by-pass the faculty.

Universities accommodated this revolution by taking the lead in collecting and maintaining the great libraries. Thus I, like faculty since the time of Gutenberg, expected to guide my students not only through discourse in the seminar, but also by helping to steer them through the accumulated knowledge stored in the stacks of the library.

TECHNOLOGICAL REVOLUTIONS THAT FAILED

In the quarter century since my classroom debut, many college administrations sought to revolutionize instruction on their campuses through new technologies. In particular, big investments were made in various audio visual resource facilities. Yet, with the exception of language laboratories, I think use of these teaching tools has remained more the exception than the rule. This failure to use A-V resources has direct implication for the subject of pc's and college faculty.

Some faculty have not made use of film and video facilities simply because of prejudice. But even faculty disposed to using them have frequently failed to do so. The reason is that effective use requires previewing and preparation. These necessary antecedents to use mean an investment of time which many faculty are not willing to make. One reason for the effectiveness of the language lab is that it requires no additional investment of teacher time.

The point of this for the present discussion is that the faculty were the key to use/non-use, success/failure of these media innovations. Without faculty interest, enthusiasm and

accommodation, such media facilities have remained outside the main stream of the educational process.

PC'S AS DISTINCT FROM MAINFRAMES

There is a potential--and dangerous--tendency among some to lump pc's and mainframes together as "computers." Mainframe computers have firmly established themselves within the university context--but, without the pc, they have not had campus-wide impact.

Mainframes remain the esoteric domain of the specialist. Programs such as SPSS have done a great deal to simplify the use of mainframes and hence broadened their clientele. But even with remote access terminals, mainframes retain the aura associated with that mysterious temple, The Computer Center. Its white-coated priests are seen operating in the inner sanctum behind glass walls. We seek out its rabbis, the programmers, in their adjacent cubicles. And often a considerable financial offering is required for programming advice and computer time.

Recognizing that there are exciting exceptions, I think it still fair to say that mainframes have had little impact in those campus domains belonging to the humanities and the arts. Even for many in the social sciences, there is a certain tension related to using the mainframe. Not only do we often have to seek the help of a programming technician, but we may be advised to modify our research plan to accomodate the computer. This is all inconvenient and, let's face it, it also erodes our view of ourselves as experts.

The complexity and the expense of using mainframes has limited their revolutionary impact to only part of the campus world. Mainframes may be seen as increasing the rift between what C. P. Snow called "the two cultures," basically the sciences and the humanities.

The pc presents a different situation. There are at least two reason why this is the case.

First, the pc is accessible, increasingly user friendly and offers benefits across all disciplines.

Second, the pc, like the book, has the potential of outflanking, by-passing the faculty. Hence, unlike these other "new" technologies, the pc does contain the potential of real revolution.

The pc will have revolutionary impact on how faculty members work. And this impact is part of a larger revolution, the information explosion, which has already created a time lag between the reality and our current practice of higher education.

THE WORK OF FACULTY

Upon my reentry to a college campus, I found that perhaps a third of my colleagues have taken the pc plunge. I am not sure how representative this group of Communications faculty is. I suspect that our percentage of pc owners may be higher than that in some liberal arts departments but lower than that in mathematics and science-related departments.

Most of my colleagues keep their pc at home. The norm is to use the pc as a "stand alone" word processor. All of us say that we are now totally "ruined" so far as writing in any manner

other than use of the word processor. It is not simply a case of the speed and ease of composing and correcting. We feel that the "cutting and pasting" facility, the ease of moving backwards and forwards helps us organize and express our thoughts.

I arrived at my new campus office with an IBM and using Wordstar. My administration has provided my secretary with a MacIntosh. Thus we are incompatible, at least so far as handling my correspondence and manuscripts.

As noted earlier, my colleagues are divided into Apples and IBMs. We IBMs are further divided by word processing programs. There is no one in my department with whom I can conveniently exchange floppy disks.

The potential of pc's for helping faculty varies across fields. But even for those in the arts and humanities, the potential extends beyond word processing. Yet all too many faculty members limit their vision of their pc to that of a glorified, souped-up typewriter.

On a shelf above my pc are the manuals for half a dozen software packages representing an investment of perhaps $1,000. With these I can store extensive data files on floppy disks and then subject those files to sophisticated statistical treatment using the pc. I can construct my own bibliographic archives with highly efficient search capability. I can maintain a "futures" calendar as well as a notepad.

But I must confess that I have not "mastered" a single one of my software packages. Pressures of time [and, in honesty, laziness] combined with lack of sophistication have handicapped

me. I get by using the bare bones basic operations of these packages without having tapped their full power. It's somewhat like having a four or five gear car and never getting out of second.

There is an analogy here to literacy. My daughter, an avid reader but a terrible speller, hates to look up words in the dictionary saying: "How can you look up a word you don't know how to spell?" I have a similar difficulty in trying to look up instructions in software manuals because I don't know the nomenclature they are using. My colleagues and I clumsily help one another, struggling through "user friendly" programs that require a higher level of computer literacy than we have attained.

I am one of the few in my department with a modem. But I must confess that so far I've made little use of it. My main purposes in obtaining it were [1] to be able to facilitate collaboration with colleagues in other cities, [2] to be able to do searches without leaving my office, and [3] to be able to send in material either from home or from other locations when I travel. Despite present frustration, I still expect to see these expectations met.

ADMINISTRATION ENTHUSIASM WITHOUT FOLLOW THROUGH

A major roadblock to effective faculty use of pc's, at least for the short-term, is the lack of follow through on the part of administrations eager to encourage expanded pc access.

My computer search produced numerous articles about major investments or gifts which provide expanded availability of pc's

to students and faculty. But none of these articles included any mention of programs to help faculty make use of them.

My own university has done little to facilitate my efficient use of the pc in support of my responsibilities to my students and the university community. I have provided my own pc, my own software. I can get a discount throught the computer department in the campus book store, but frankly I often find better prices on hardware and software through other outlets.

There is no attempt by administration at any level to encourage or facilitate compatibility between or within different departments. There are no provisions for those wishing to make initial investments or to expand their present private equipment and/or software library.

I have been provided with a good modem and a dedicated phone line, for which I am grateful. But I have had to struggle to determine what modification of my pc was needed to use it, to find a software package, to make my own illiterate groping to learn its use.

I take a more serious view of the fact that I am limited to commercial services for which I make my own arrangements. There is no provision, at least as yet, to make it possible for me to use the university's umbrella to enter data archives appropriate to my work. I am not asking to be provided with financial support to pay for use of these archives, only the convenience of being able to do so from my own office.

Faculties at some other schools are more fortunate than I and my colleague's, but I suspect that our situation is no worse and

maybe even better than than of faculty on most of the nation's campuses.

THE NEED FOR COMPUTER LITERACY CAMPAIGNS FOR FACULTY

Many of today's faculty are computer illiterates--some of them aggressively so. I have one colleague who visibly shudders anyone when mentions computers. Such faculty dislike the computer, instinctively sensing its potential as a competitor and threat to the status quo in higher education.

Perhaps we should just "write off" this group as an incorrigible remnant, an "old guard" which will pass in a few years.

I am more concerned about lack of support for those who are willing, maybe even eager, to move into a new educational environment which incorporates pc's. Leadership and guidance is necessary to help these faculty effect an orderly transition to this new environment which is being created either with or without material support from central administrations.

My search did produce one article concerning a program to make pc's widely available and which underlined that this availability had not [automatically] produced effective faculty utilization.

The point is that administrations seeking to provide pc's for faculty are repeating the mistake so frequently noted in previous programs of previous technological innovation. That mistake is assuming that a large investment to provide the technology is sufficient in and of itself. Administrators ignore the further

requirement to train faculty in the use of the technology and a sustained effort to provide coordination of services to reduce frustration in its use.

Although this mistake has been common, there is an important difference between A-V teaching aids and the pc. The pc has the potential of a significant personal pay-off which cuts across the normal activity of academics. Word processing alone can be a major incentive to even members of the "old guard" to join the "pc generation."

I had the opportunity to observe this in my my prior institution. There the administration made draconian reductions in secretarial support while simultaneously offering academic staff word processors. What made the change effective was provision of training at the convenience of the individual academics and provision for continuing back-up support when problems or questions arose. Frustration and embarrasment were kept to the minimum. Not everyone made the jump but among those who did were some older members of the academic staff who had never learned to type.

Most of today's faculties have not had the advantages offered to many students who have come through preparatory schools where computer literacy is being taught. In short, we need computer literacy campaigns for our faculties.

THE PC AND PUBLISH OR PERISH

Mention of pressures on faculty for research, grantmanship and publication run like a litany through the articles in the Times supplement. These pressures, juxtaposed with a narrowing

of the opening to the elysian fields of academic tenure, preoccupy college faculty. Expanding the tenure gap is beyond the capability of pc's, but they can play an extremely important role in research and writing which forms the basis of publication.

For example, remote terminals can access data banks stored in high capacity mainframe computers. In my own field, ERIC has been a godsend in the two-headed form of computer stored annotated index and microfiche. Other services have taken the next step and can instantly provide hard copy of articles.

With a pc, a modem, and appropriate access authorization codes, the individual scholar can dive into these computer banks and obtain information much more easily than by struggling through the physical maze of library stacks--from which all too often books have vanished without record, articles have been slashed from journals.

Software packages replace at least some of the old 3x5 file card drudgery associated with literature searches. Their provisions for searching "key words" can be of immense help in synthesis.

SPSS is now available in a pc version along with other very efficient data analysis packages. As a reluctant pioneer with factor analysis in my field, my master's thesis data was limited to 20 variables. That was the capacity of the correlational program on Stanford's mainframe in 1956. And to use it, I needed an NSF grant to pay the charge. Today, I can run programs

involving 300 variables and samples of 5,000 on my pc--without leaving my office, without any budget for programmer or computer time.

The pc can greatly facilitate the research and replace much of the drudgery which has accompanied the creative process. But that is no guarantee that the quality of faculty research and publication will increase.

POSSIBLE SCHOLASTIC PROSTITUTION

A major problem, however, is the prostitution of research and publication within the higher education setting. The emphasis on research, grants and publications as promotion criteria presupposes that they are correlates of academic excellence. The researching professor is seen to be the professor with the creative, searching, stimulating mind. The publishing professor is one who obviously is contributing to the storehouse of knowledge. Such contribution is taken to be an indication of ability to function as the wise, scholarly guide for students.

From personal observation, I know that the number of journals, their frequency and edition size have all grown rapidly in the last two decades. The number of academic book titles published has also increased dramatically.

Attendance at scholarly conventions provides essential visibility for young faculty. This has resulted in a chicken-and-egg expansion. To obtain travel funds to attend these meetings, it is essential to have a paper accepted for the program.

To maintain or expand participation, organizations have accomodated these pressures by adding sessions. New organizations have been formed to sponsor new meetings for new specializations. The result is that each year there are more and more papers given with no guarantee that standards have been maintained, much less raised.

Because of the pressures for publication, scholars seek to get maximum recognition out of research effort. They write multiple papers based on the same data, submitting them to journals across fields.

IDIOTS SAVANTS BY PC

The result of these increased meetings, multipled journals and papers is bloat of the literature, a debasing of the currency of scholasticism stored in our libraries and archives.

A recent ERIC search heightened my own frustration with this problem. My search turned up sequences of redundant articles by the same authors in different journals. A charitable interpretation is that the authors may have been trying to make their findings broadly available across fields. The practical reality of my experience was that they increased my labor. In response to my search descriptors, all their articles appeared. Thus I was forced to skim through much more material than was really necessary to learn what they had to contribute.

Pc's certainly can reduce the sheer drudgery of essential number crunching which in the past has diverted energy from more creative effort. But this same technological assistance can be used to increase redundant, unthinking use of quantitative data.

The spectre I see is an expansion of the type of puerile "research" and publication flatulance which already reflects overindulgence encouraged by "publish or perish." Pc's make possible a new breed of "idiot savant" and that breed can be manifested among faculty as well as among students.

I am reminded of the caution which my statistics professor [Quinn McNemar] urged on us regarding computers back in 1957. Computers, he said, made things so easy that one is tempted to let the thought process slip. As a result, the safeguard of taking a critical look at our data frequently falls through the cracks.

Every time I see all the significance test results at the bottom of an SPSS printout, I think of McNemar's caution. It seems to me that, more often than not, the data in the cells do not meet the assumptions which underlie many of these tests.

My own experience with graduate assistants is that the pocket calculator has been a mixed blessings. Actually handling data, playing with cross-tabs, marginals and computing percentages and chi squares produced an almost instinctive feeling for "bad" data among my generation. Students who have grown up with these "automatic" number crunchers seem not to develop this instinct. They blissfully rush into print with interpretations based on results which might be most charitably termed "shaky."

Students and faculty-to-be trained to do computer searches based on use of descriptors run the risk of falling into a deductive rut. They may miss those unexpected creative insights

which sometimes jumped out of the drudgery of traditional literature searches.

I can dream of a floppy disk package covering the encylopedic collection of details I must cover in the introductory course I give for our undergraduate majors, an auditorium course with 170 or more students. Such a package would present the many discrete bits of knowlege in branched programs, could have built in reviews and tests. It would replace both text and lectures. I could use the time spent preparing and delivery lectures for small seminars. Through these I could help students organize, not just facts, but thoughts about the facts which they have learned through using the pc program.

TO SUMMARIZE

1. The pc provides a revolutionary tool with applications cutting across the entire campus. These include computational/modelling/graphics/word processing/archive storage and retrieval/bibliographic and notepads. They can aid communication--between scholars, between campuses, between faculty and students, between faculty and administrative records.

2. Availability does not mean use. Use does not mean optimum utilization.

3. To help faculty acquire effective "computer literary," administrations must provide training and continuing assistance as well as assistance in obtaining hardware and software, .

4. There will be a need to reassess expectations and reward structures for both students and faculty. Literature can be searched more quickly, more efficiently than in the past. Data

can be massaged more quickly, more elegantly. Thus the "grunt work" of "scholarship" should be diminished. The challenge is to harness the time and energy saved to expand thinking and creativity.

5. A peril to be avoided is the substitution of computer-generated elegance for creativity and thoughtfulness. Just as some people get "hooked" by computer games, some get lost in refinements of programming and data massage. I can remember a programmer who was so caught up in program elegance that he totally lost track of the practical necessities for which I had hired him. We must not let reliance on computer programs dull inductive insight and we must avoid than the trap of accepting data without examination of assumptions, validity, reliability.

6. We must find a way to defuse the threat of having the scholarly literature further diluted by a pc-generated explosion of pseudo "information" or "contribution." Standards for acceptance of papers and articles must be strengthened. Ultimately, this means that we have to adjust the reward/appointment/promotion criteria used in higher education.

HIGHER EDUCATION AND POST SECONDARY EDUCATION

I have approached this essay from the standpoint of a college professor. And in writing it I have become increasingly conscious that this results in a limited [and very elitist] approach to higher education.

In considering the impact of pc's, I have used the starting point of Socrates' academy and the goal of faculty guiding

students in the acquisition of wisdom. But, let's be honest and admit how far we have strayed from that ideal in today's higher education.

"Post secondary education" is not always "higher education." Post secondary education today includes a wide variety of activities which might more accurately be grouped under "training" than "education." They reflect legitimate needs of the "post industrial society" in which we now find ourselves. For various reasons, mostly related to politics and economics, these have been thrust into the traditional context of post secondary education--the campuses and curricula of colleges and universities.

The result is a distortion of these institutions which is now becoming painful for all concerned. Hopefully we can find the energy and the will to use the challenge presented by the pc as a catalyst to reassess and restructure post secondary education and to rescue higher education.

I spoke earlier of faculty colleagues who incorrigibly resist the computer and the pc. Yet these are the colleagues who most frequently hold aloft the Socratic ideal whereas many of the "computer freaks" have never heard of Socrates. The ultimate irony is that, while the incorrigibles would quaff a cup of hemlock before submitting to computer literacy, the pc's are rapidly easing the access of students to knowledge. If faculty are displaced by this new ease of access, it will be the result of their own intransigence in the face of the opportunities offered by the pc.

CONCLUSION

The pc provides us an opportunity to constructively re-examine and restructure the entire educational structure so that it provides potential for greater individual personal growth while simultaneously better meeting the needs of the post-industrial society.

Much rote learning and basic teaching can be done very effectively by programmed instruction/reading/exercises/review/testing which can be packaged on floppy discs. The challenge is to use these in ways which make more time for students to have thoughtful interaction with faculty, rather than reducing or replacing faculty with software. Computer searches may reduce, even replace, the need for faculty as a guide to the literature. But teachers will still be needed to guide students in the acquisition of judgement, values, synthesis.

In candor, I am not sure that all--maybe even a majority--of today's teachers are prepared, have the qualities needed for a return to the groves of academe. The post-World War II period emphasis on research and a reward structure based on publications rather than teaching has deflected faculty concern from students to their own "scholarship." Too many faculty are too self-centered to function as "teachers."

These are probably the faculty who are best equipped to quickly embrace the pc as an aid to their work. But they are likely to use it selfishly, without giving priority to the improvement of their teaching. They are likely to see pc

programs as a new form of Teaching Assistant on whom they can foist the annoying necessity of involvement with students. There is a real danger that they will use the pc to inflate, rather than improve, their publications, thereby undermining rather than strengthening the scholarly community.

In considering the potential of pc's for higher education, we need to reassess post secondary education. Education is a process and we must stipulate what we expect it to accomplish.

Universities and colleges are institutions to accomodate that process. They have evolved and continue to evolve. And there are other institutional options for accommodating needs in the field of post secondary education.

The pc will stimulate further evolution of the form of these institutions. For that evolution to be rationale, we must keep returning to consideration of the process. Ultimately this process centers on the transfer of information and culture across the generations.

As a faculty member, I like to think that faculty continue to be catalysts in this process. But the way we fulfill this catalytic role is flexible. If we don't learn to use the pc in support of this role, students will by-pass us. This is a cause for grave concern--not for trade union reasons of job security, but because it would further weaken the human components which are essential to true higher education.

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September, 1985